WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device, comprising a dual-stage deposition step comprising:

a first stage for introducing a material gas containing desired metal into a reaction chamber in which a semiconductor substrate on a surface of which a metal film is formed in part or in entirety is placed to thus form an oxide film made of said specified metal by a vapor-phase growth method and the following second stage for removing from said reaction chamber said material gas introduced into said reaction chamber at said first stage and a byproduct produced at said first stage, and

wherein said metal oxide film as an oxide of said specified metal is formed on said semiconductor substrate, by repeating said dual-stage deposition step two or more times.

2. The method according to claim 1, wherein said semiconductor substrate has a cylindrical trench on a surface thereof in such a configuration that said metal film is formed on a bottom and an inner side wall of said cylindrical trench.

3. The method according to claim 1, wherein said material gas and said byproduct produced at said first stage are removed by introducing a gas different from said material gas at said first stage into said reaction chamber at said second stage.

4. The method according to claim 1, wherein said material gas and said byproduct produced at said first stage are removed by depressurizing said reaction chamber at said second stage.

5. The method according to claim 4, wherein after having performed said depressurizing at said second stage and before said first stages starts in a next dual-stage deposition step, a gas different from said material gas is introduced into said reaction chamber to thus recover a gas pressure before performing said depressurizing in said reaction chamber.

6. The method according to claim 1, wherein said metal oxide film having a finally required film thickness is formed by repeating said steps a plurality of number of times.

7. The method according to claim 1, wherein after said steps are repeated a plurality of number of times, said material gas is introduced continuously for a time longer than that required for said first stage, to form said metal oxide film having the finally required film thickness.

8. The method according to claim 1, wherein an oxidizing gas is introduced at said first stage.

9. The method according to claim 8, wherein introduction of said oxidizing gas is started from a second-time said steps.

10. The method according to claim 1, wherein said second stage comprises a process for introducing an oxidizing gas and a process for introducing said material gas and a gas different from said oxidizing gas.

11. The method according to claim 3, wherein said gas

different from said material gas is an inactive gas.

12. The method according to claim 11, wherein said inactive gas is a nitrogen gas.

13. The method according to claim 1, wherein said metal film is made of metal having a catalytic action.

14. The method according to claim 1, wherein said vapor-phase growth method is a chemical vapor deposition method or a physical vapor deposition method.

15. The method according to claim 1, wherein said metal oxide film as said oxide of said specified metal is made of at least one selected from the group consisting essentially of tantalum, hafnium, zirconium, and niobium.

16. The method according to claim 15, wherein tantalum penta-ethoxide is used as said material gas.

17. The method according to claim 8, wherein as said oxidizing gas, a gas containing oxygen, ozone, water, nitrogen oxide, or oxygen radical is used.

18. The method according to claim 13, wherein as said metal having a catalytic action, ruthenium or platinum is used.

19. A method for manufacturing a semiconductor device having a capacitor, comprising:

a dual-stage deposition step comprising:

a first stage for introducing a material gas containing desired metal into a reaction chamber in which a semiconductor substrate on a surface of which a metal film is formed in part or in entirety is placed to thus form an oxide film made of said desired metal by a vapor-phase growth method and the following second stage for removing from said reaction chamber said material gas introduced into said reaction chamber at said first stage and a byproduct produced at said first stage, and

wherein said metal oxide film as an oxide of said specified metal is formed on said semiconductor substrate, by repeating said dual-stage deposition step two or more times, thereby forming a capacitive insulating film to make up said capacitor; and

forming an upper electrode to make up said capacitor on said capacitive insulating film.

20. The method according to claim 19, wherein said semiconductor substrate has a cylindrical trench on a surface thereof in such a configuration that said metal film is formed on a bottom and an inner side wall of said cylindrical trench.

21. The method according to claim 19, wherein said material gas and said byproduct produced at said first stage are removed by introducing a gas different from said material gas at said first stage into said reaction chamber at said second stage.

22. The method according to claim 19, wherein said material gas and said byproduct produced at said first stage are removed by depressurizing said reaction chamber at said second stage.

23. The method according to claim 22, wherein after having performed said depressurizing at said second stage and before said first stages starts in a next dual-stage deposition step, a gas different from said material gas is introduced into said reaction chamber to thus recover a gas pressure before performing said depressurizing in said reaction chamber.

24. The method according to claim 19, wherein said metal oxide film having a finally required film thickness is formed by repeating said steps a plurality of number of times.

25. The method according to claim 19, wherein after said steps are repeated a plurality of number of times, said material gas is introduced continuously for a time longer than that required for said first stage, to form said metal oxide film having the finally required film thickness.

26. The method according to claim 19, wherein an oxidizing gas is introduced at said first stage.

27. The method according to claim 26, wherein introduction of said oxidizing gas is started from a second-time said steps.

28. The method according to claim 19, wherein said second stage comprises a process for introducing an oxidizing gas and a process for introducing said material gas and a gas different from said oxidizing gas.

29. The method according to claim 21, wherein said gas

different from said material gas is an inactive gas.

30. The method according to claim 29, wherein said inactive gas is a nitrogen gas.

31. The method according to claim 19, wherein said metal film is made of metal having a catalytic action.

32. The method according to claim 19, wherein said vapor-phase growth method is a chemical vapor deposition method or a physical vapor deposition method.

33. The method according to claim 19, wherein said metal oxide film as said oxide of said specified metal is made of at least one selected from the group consisting essentially of tantalum, hafnium, zirconium, and niobium.

34. The method according to claim 33, wherein tantalum penta-ethoxide is used as said material gas.

35. The method according to claim 26, wherein as said oxidizing gas, a gas containing oxygen, ozone, water, nitrogen oxide, or oxygen radical is used.

36. The method according to claim 31, wherein as said metal having a catalytic action, ruthenium or platinum is used.

37. A method for manufacturing a semiconductor device, performing a first stage for introducing a material gas containing

desired metal into a reaction chamber in which a semiconductor substrate on a right side of which a metal film is formed is placed to thus form an oxide film made of said desired metal by a vapor-phase growth method and the following second stage for removing from said reaction chamber said material gas introduced into said reaction chamber at said first stage and a byproduct produced at said first stage and then introducing said material gas continuously for a lapse of time longer than said first stage, thereby forming an oxide film made of said metal having a finally required film thickness.